Verifying Freeform Progressive Lens Powers

By Todd Hasselius is an ABO approved speaker and optical technologies graduate of Anoka Technical College, in the July 2008 Continued Education Course # SJM193-1 of the American Board of Opticianry (ABO).

Discrepancy: Phoropter Rx vs Px Needs

There's a discrepancy between the prescription derived from the phoropter because of the way it is positioned in front of the eye and the way that eyeglass lenses are positioned. The distance from the back of the lens to the front surface of the eye (vertex distance) is typically different from the distance the practitioner placed the refractor from the eyes. The same is true for the tilt of the lens (pantoscopic) and the faceform (panoramic angle) wrap of the lenses. The refractor's lenses are positioned differently from the way that eyeglasses fit. These differences affect the effective power of the lens i.e., the lens has a different prescription in the way they are being worn than the way in which they were tested.

Some would say that for the average patient, the differences would be small. However, if our goal were to provide the option of the best vision possible, then we would want to adjust for the correct wearing positions.

You may of course do the compensation calculation yourself. To see how, view our download Effect of Tilt & Vertex Distance on Spectacle Lenses.

As-worn Progressive Lens Powers

By providing the additional measurements namely pantoscopic tilt, panoramic angle and vertex distance, a prescription is fine-tuned. This ensures the patient gets the proper Rx for the frame in the way that it is worn on the face.

So, the practitioner’s prescription will be modified taking the additional fitting requirements into account. The lab will return the glasses with two prescriptions:

• the original prescribed Rx and
• the “as-worn” Rx - use the as-worn Rx to verify the lens prescription in a lensmeter; if an Rx is altered by the way it is worn, compensating the Rx for the wearing effects ensures the final pair of glasses actually delivers the prescription the practitioner wrote.

The effects of position change powers. A powered lens moved away from the eye becomes more plus and more minus when moved closer. Lenses tilted change sphere and cylinder power. To test these, place a -4 sphere lens in an automated lensmeter and change the position up and down on the lens stop or change the tilt and watch the prescription change. As a result, to deliver the right prescription, lenses should be compensated to deliver the prescribed Rx. For many free-form progressive lenses, back vertex power measurements are often used for add power verification as well. Due to the complexities of measuring the add power of progressive lenses, however, use of the semi-visible engravings for add power verification is preferable.

For example:

A prescription of R -4.25 sphere, L -3.75 -1.00 x 90, add +2.00 with fitting requirements of PD 31.0/31.5, height of 17.5/17.0, tilt of 10 degrees, vertex 11.5mm (refracted at 13.5mm) and panoramic angle of 6 degrees would be returned as a R -4.12 -0.12 x 54, L -3.62 -1.00 x 93, add +2.00. Therefore, the compensated Rx will see as the prescribed Rx when worn in the frame. Clearly, those with higher prescriptions that need their glasses for full time wear benefit the most.